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The Engineered Wood Association

Apparent E and Shear-Free E

For structural glued laminated timber (glulam) and most structural composite lumber (SCL) marketed in North America, such as laminated veneer lumber (LVL), the values of apparent modulus of elasticity ($E_{apparent}$) are generally published. Some SCL manufacturers, however, elect to publish shear-free modulus of elasticity ($E_{shear\text{-}free}$) values. The difference between $E_{apparent}$ and $E_{shear\text{-}free}$ is that $E_{apparent}$ includes both bending deflection and shear deflection, while $E_{shear\text{-}free}$ does not. Therefore, for those proprietary products for which the $E_{shear\text{-}free}$ is published, the shear deflection must be calculated separately from the bending deflection and the two values must be combined for code-compliance. Otherwise, the structural design could be nonconservative when deflection governs.

The publication of $E_{apparent}$ and $E_{shear\text{-}free}$ values for a wide variety of engineered wood products without identifying what E value is being tabulated can be a cause of confusion when comparing similar products offered by different manufacturers or when the need for product substitution arises. To avoid confusion, Equation 1 or Table 1 can be used as a rule of thumb to convert a published $E_{apparent}$ to $E_{shear\text{-}free}$, or vice versa, so that an equitable comparison between similar products can be made:

$$E_{shear-free} = 1.05 \times E_{apparent} \qquad [1]$$

Table 1. Equivalent $E_{apparent}$ and $E_{shear\text{-}free}$ [(a)]

$E_{apparent}$ (10^6 psi) [(b)]	Equivalent $E_{shear\text{-}free}$ (10^6 psi)
1.5	1.6
1.6	1.7
1.7	1.8
1.8	1.9
1.9	2.0
2.0	2.1
2.1	2.2

a) Refer to APA Technical Topics TT-082 for detailed information.
b) As published for glulam.

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